

IN THE CLAIMS

Listing of Claims

1. (Currently Amended) A method for treating a surface of a substrate plate in an isolated environment under irradiation of ultraviolet ray emitted from a dielectric barrier discharge lamp while said substrate plate is being transferred by a transfer means, said method comprising:

removing oxygen on and in the vicinity of a treating surface of said substrate plate in the isolated environment by blasting an inert gas on said treating surface of said substrate plate at an oblique angle toward an upstream side in a substrate transfer direction;

humidifying said treating surface and surrounding atmosphere of said substrate plate in the isolated environment by supplying a humidified inert gas to said substrate plate obliquely toward a downstream side in said substrate transfer direction; and

irradiating said treating surface of said substrate plate in the isolated environment with ultraviolet ray from said dielectric barrier discharge lamp.

2. (Original) A method for treating a surface of a substrate plate as defined in claim 1, wherein oxygen is removed from said treating surface of said substrate plate by blasting thereto an inert gas or a humidified inert gas.

3. (Original) A method for treating a surface of a substrate plate as defined in claim 1, wherein said inert gas is nitrogen gas.

4. (Currently Amended) A method for treating a surface of a substrate plate while being transferred horizontally across a treating chamber, having an isolated environment, under irradiation of ultraviolet ray emitted from a dielectric barrier discharge lamp, said method comprising:

removing oxygen or air on and in the vicinity of a treating surface of said substrate plate, in the isolated environment, by blasting an inert gas on said treating surface at an oblique angle toward an upstream side in a substrate transfer direction;

humidifying said treating surface and surrounding atmosphere of said substrate plate, in the isolated environment, by supplying a water vapor-containing humidified inert gas to said substrate obliquely toward a downstream side in said substrate transfer direction; and irradiating said treating surface of said substrate plate, in the isolated environment, with ultraviolet ray from said dielectric barrier discharge lamp thereby cracking water vapor into a reductive active member $[H\cdot]$ and an oxidative active member $[\cdot OH]$ for reaction with contaminant substances on said treating surface.

5. (Withdrawn) An apparatus for treating a surface of a substrate plate under irradiation of ultraviolet ray, said apparatus comprising:

a treating chamber provided in part of a path along which a substrate plate is transferred horizontally by a conveyer means, said treating chamber being provided with a dielectric barrier discharge lamp for irradiating ultraviolet ray on a treating surface of said substrate plate;

a humidified inert gas feed means located at a position upstream of an irradiating region of said dielectric barrier discharge lamp in substrate transfer direction thereby to supply a humidified inert gas toward said treating surface of said substrate plate; and

an oxygen removing means located at a position upstream of said humidified inert gas feed means in said substrate transfer direction for removing oxygen from said treating surface and surrounding atmosphere of said substrate plate.

6. (Withdrawn) An apparatus for treating a surface of a substrate plate as defined in claim 5, wherein said dielectric barrier discharge lamp is installed in a closed lamp house having on the bottom side thereof a ultraviolet ray irradiating window fitted with a glass pane.

7. (Withdrawn) An apparatus for treating a surface of a substrate plate as defined in claim 5, wherein said dielectric barrier discharge lamp is installed in a lamp house having an open window on bottom side thereof for irradiating ultraviolet ray therethrough.

8. (Withdrawn) An apparatus for treating a surface of a substrate plate as defined in claim 5, wherein said humidified inert gas feed means comprises a wet nitrogen gas injecting nozzle projected into said treating chamber and adapted to spurt water vapor-containing humidified nitrogen gas toward said treating surface of said substrate plate obliquely from above and in a forward direction in said substrate transfer direction.

9. (Withdrawn) An apparatus for treating a surface of a substrate plate as defined in claim 5, wherein said oxygen removing means comprises a dry inert gas injection nozzle located in the vicinity of an entrance opening of said treating

chamber and adapted to blast a dry inert gas on said treating surface of said substrate plate obliquely from above and in a direction opposite to said substrate transfer direction.

10. (Withdrawn) An apparatus for treating a surface of a substrate plate as defined in claim 9, further comprising upper and lower suction boxes provided on the upper and lower side of said path of transfer of said substrate plate and immediately on the outer side of said entrance opening of said treating chamber.

11. (Withdrawn) An apparatus for treating a surface of a substrate plate as defined in claim 5, wherein said oxygen removing means comprises an air injection nozzle located in the vicinity and on the outer side of an entrance opening of said treating chamber and adapted to blast dry air on said treating surface of said substrate plate obliquely from above and in a direction opposite to said substrate transfer direction.

12. (New) The method of claim 1, wherein the isolated environment is in a chamber.